ROCKY MOUNTAIN COLLEGE

Course Syllabus: MAT 176 – Calculus II

Spring Semester 2013, Section 2

Instructor: Ulrich Hoensch, Ph.D.

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- Office Hours: Monday, Wednesday 9:00 a.m. - 10:00 a.m. and 2:00 p.m. - 3:00 p.m; Tuesday, Thursday 9:00 a.m. - 10:00 a.m; Friday 9:00 a.m. - 10:00 a.m.; and other times by appointment.

Class Information

- Credits: 5 semester hours
- Class Meetings: Monday, Tuesday, Wednesday, Thursday, Friday 1:00 p.m. - 1:50 p.m.
- Room: Morledge/Kimball 125
- Class Web Page: `www.rocky.edu/~hoenschu/SS_2013/MAT176/main.html`

Text/Calculator Weir/Hass/Giordano, *Thomas' Calculus: Early Transcendentals*, Twelfth Edition, Pearson Addison-Wesley (required); a graphing calculator such as the TI-83 Plus is required.

Course Description Continuing the study of functions of one real variable, the formal definition and means of computation of Riemann integrals is introduced and applied to physical problems. Introduction to sequences and series. The use of graphing calculators is required. Prerequisite: A grade of "C" or higher in MAT 175.

Rationale MAT 176 can be used to fulfill part of Rocky Mountain College's Mathematics General Education Requirement. It is a highly recommended course for students seeking true academic and intellectual excellence. MAT 176 will assure that students in the teacher education program will be knowledgeable in the concepts underlying integral calculus, modeling using integration, and the formal computation of integrals (the course provides content knowledge in mathematics, as indicated in the RMC Teacher Education Program Conceptual Framework).

Course Objectives At the completion of MAT 176, students will be able to:

(1) Accurately use finite sums and sigma notation.

(2) Approximate definite integrals from finite sums.

(3) Compute definite and indefinite integrals using antiderivatives.

(4) Model real-world situations using functions and equations, and use integration to solve questions involving areas, volumes, and lengths of curves.

(5) Compute integrals using integration techniques, including substitution, integration by parts, partial fraction decomposition, and trigonometric substitutions.

(6) Determine convergence or divergence of sequences of real numbers, and, where appropriate, compute limits of such sequences.

(7) Determine the convergence or divergence of infinite series, and, where appropriate, determine the value of such series.

(8) Use power series and Taylor series to approximate and obtain information about analytic functions.

(9) Apply mathematical proofs presented in class and provide simpler or similar proofs themselves.

(10) Explain the theoretical concepts involved in integral calculus, and accurately state the main theoretical results.

(11) Provide written explanations of mathematical ideas and exhibit correct use of mathematical terms and language.

Methods of Evaluation Students will be evaluated based on the following evidence.

- Tests, in-class and homework assignments.
- Attendance record, timeliness, the amount of courtesy and respect extended towards fellow students and the instructor.
- Level of academic and personal honesty and integrity.

Criteria for Grade Assignment To receive a passing grade, a student must show evidence that she/he is able to successfully perform the tasks laid out as course objectives (see above). Furthermore, students must attend all class meetings, arrive on time and exhibit appropriate classroom and social behavior. All submitted work must be the student's own work, or if it is not, names of sources or collaborators must be identified.

Possible points will come from:

- 3 one-hour, in-class tests, each worth 100 points; here students must submit only their own work, by using only a graphing calculator, or other explicitly permitted material.
- The final exam, which is worth 200 points; here students must submit only their own work, by using only a graphing calculator, and other explicitly permitted material.

- Several in-class assignments, or homework assignments, worth a total of 300 points.

This amounts to a total of 800 possible points. The following grading scale will be used to assign grades.

A: 90%, or more B: 80% - 89% C: 70%-79% D: 60%-69% F: less than 60% of possible points.

Instructional Methods and Experiences This is a small-class lecture with in-class practice sessions. Student participation in the lecture is encouraged, group work is encouraged for the in-class work. Study groups outside of class are strongly recommended. However, completion of homework assignments must be done independently by each student.

Class Policies Students are required to attend all class meetings and complete all assignments. All homework assignments must be submitted at the beginning of class on the due date. All in-class assignments, including tests and exams, must be completed in the time allotted by the instructor. All work on tests and exams must be the student's own work, and may only be obtained through the use of allowed tools. Homework assignments must be completed independently by each student. Tests and exams may only be made up if the instructor is notified in advance of qualified absences. Qualified absences are limited to the following: (a) activities connected with Rocky Mountain College programs; (b) illness (in which case a doctor's note is required); (c) a family or personal emergency, or due to force majeure. In cases (b) and (c) above, students may be excused from assignments if they notify the instructor immediately after their absence.

College Academic Policies Students must abide by all Academic Integrity Policies of the College. See `http://www.rocky.edu/academics/course-catalog/FormsPolicies.php` for details.

Date	Remarks/Topics
Mon Jan 07	**First Day of Class**, 4.6 L'Hôpital's Rule
Tue Jan 08	4.8 Antiderivatives
Wed Jan 09	4.8 Antiderivatives
Thu Jan 10	5.1 Estimating with Finite Sums
Fri Jan 11	5.1 Estimating with Finite Sums
Mon Jan 14	5.2 Sigma Notation and Limits of Finite Sums
Tue Jan 15	5.2 Sigma Notation and Limits of Finite Sums
Wed Jan 16	5.3 The Definite Integral
Thu Jan 17	5.3 The Definite Integral
Fri Jan 18	5.4 The Fundamental Theorem of Calculus
Tue Jan 22	5.4 The Fundamental Theorem of Calculus
Wed Jan 23	5.5 Indefinite Integrals and the Substitution Rule
Thu Jan 24	5.5 Indefinite Integrals and the Substitution Rule
Fri Jan 25	5.5 Indefinite Integrals and the Substitution Rule
Mon Jan 28	5.6 Substitution and Area Between Curves
Tue Jan 29	5.6 Substitution and Area Between Curves
Wed Jan 30	Review for Test 1
Thu Jan 31	**Test 1**
Fri Feb 01	6.1 Volumes Using Cross-Sections
Mon Feb 04	6.1 Volumes Using Cross-Sections
Tue Feb 05	6.1 Volumes Using Cross-Sections
Wed Feb 06	6.2 Volumes Using Cylindrical Shells
Thu Feb 07	6.2 Volumes Using Cylindrical Shells
Fri Feb 08	6.3 Arc Length
Mon Feb 11	6.3 Arc Length
Tue Feb 12	8.0 Basic Integration Formulas
Wed Feb 13	8.0 Basic Integration Formulas
Thu Feb 14	8.0 Basic Integration Formulas
Fri Feb 15	8.1 Integration by Parts
Mon Feb 18	8.1 Integration by Parts
Tue Feb 19	8.1 Integration by Parts
Wed Feb 20	8.2 Trigonometric Integrals
Thu Feb 21	8.2 Trigonometric Integrals
Fri Feb 22	8.2 Trigonometric Integrals
Mon Feb 25	Review for Test 2
Tue Feb 26	**Test 2**
Wed Feb 27	8.3 Trigonometric Substitutions
Thu Feb 28	8.3 Trigonometric Substitutions
Fri Mar 01	8.3 Trigonometric Substitutions
Mon Mar 11	8.4 Integration of Rational Functions by Partial Fractions
Tue Mar 12	8.4 Integration of Rational Functions by Partial Fractions
Wed Mar 13	8.4 Integration of Rational Functions by Partial Fractions
Thu Mar 14	8.7 Improper Integrals
Fri Mar 15	8.7 Improper Integrals

Date	**Remarks/Topics**
Mon Mar 18	8.7 Improper Integrals
Tue Mar 19	10.1 Sequences
Wed Mar 20	10.1 Sequences
Thu Mar 21	10.1 Sequences
Fri Mar 22	10.2 Infinite Series
Mon Mar 25	10.2 Infinite Series
Tue Mar 26	10.2 Infinite Series
Wed Mar 27	Review for Test 3
Thu Mar 28	**Test 3**
Tue Apr 02	10.3 The Integral Test
Wed Apr 03	10.3 The Integral Test
Thu Apr 04	10.4 Comparison Tests
Fri Apr 05	10.4 Comparison Tests
Mon Apr 08	10.4 Comparison Tests
Tue Apr 09	10.5 The Ratio and Root Tests
Wed Apr 10	10.5 The Ratio and Root Tests
Thu Apr 11	10.5 The Ratio and Root Tests
Fri Apr 12	10.6 Alternating Series, Absolute and Conditional Convergence
Mon Apr 15	10.6 Alternating Series, Absolute and Conditional Convergence
Tue Apr 16	10.6 Alternating Series, Absolute and Conditional Convergence
Wed Apr 17	10.7 Power Series
Thu Apr 18	10.7 Power Series
Fri Apr 19	10.7 Power Series
Mon Apr 22	10.8 Taylor and Maclaurin Series
Tue Apr 23	10.8 Taylor and Maclaurin Series
Wed Apr 24	10.8 Taylor and Maclaurin Series
Thu Apr 25	Review for the Final Exam
Fri Apr 26	Review for the Final Exam
Tue Apr 30	**2:30 p.m. - 4:30 p.m. Final Exam in Morledge/Kimball 125**

OPI/PEPPS Standards

Standard	Course Objective
10.58.518 Mathematics	
(1) The program requires that successful candidates:	
(a) demonstrate knowledge and understanding of and apply the process of mathematical problem solving;	(4)
(b) reason, construct, and evaluate mathematical arguments and develop an appreciation for mathematical rigor and inquiry;	(9), (10), (11)
(d) recognize, use, and make connections between and among mathematical ideas and in contexts outside mathematics to build mathematical understanding;	(4), (11)
(e) use varied representations of mathematical ideas to support and deepen students' mathematical understanding;	(10), (11)
(f) appropriately use current and emerging technologies as essential tools for teaching and learning mathematics;	(2), (4)
(3) demonstrate content knowledge in:	
(d) calculus by demonstrating a conceptual understanding of limit, continuity, differentiation, and integration and a thorough background in the techniques and application of the calculus;	(1), (2), (3), (4), (5), (6), (7), (8), (9), (10), (11)